

AMENDMENTS TO THE CLAIMS

Claims 1-14. (Canceled)

15. (New) An origin detection method for a component placement head including
- (i) linearly arranged shaft sections, each of said shaft sections having an end portion provided with a component holding member for releasably holding a component to be placed onto a circuit board,
 - (ii) elevation units corresponding one to one with said shaft sections, each of said elevation units for moving up and down a corresponding one of said shaft sections along an axis of rotation of said corresponding one of said shaft sections, said each of said elevation units being comprised of
 - (a) a ball screw shaft section rotatably supported about an axis of rotation of said ball screw shaft section,
 - (b) a drive section, fixed to an end portion of said ball screw shaft section, for rotating said ball screw shaft section about said axis of rotation of said ball screw shaft section,
 - (c) an elevation nut section meshed with said ball screw shaft section and being elevatable along said axis of rotation of said ball screw shaft section via rotation of said ball screw shaft section, and
 - (d) an engagement member fixed to said elevation nut section and engaged with said corresponding one of said shaft sections, said engagement member being able to move said corresponding one of said shaft sections up and down in synchronization with ascent and descent of said elevation nut section; and
 - (iii) a light-projecting section and a light-receiving section arranged opposite to each other along an array direction of the ball screw shaft sections such that said elevation nut section of said each of said elevation units is capable of being positioned between said light-projecting section and said light-receiving section, whereby, when said elevation nut section

of said each of said elevation units is not positioned between said light-projecting section and said light-receiving section, light emitted by said light-projecting section is not interrupted by said elevation nut section and is received by said light-receiving section, and when said elevation nut section of said each of said elevation units is positioned between said light-projecting section and said light-receiving section, light emitted by said light-projecting section is interrupted by said elevation nut section and is not received by said light-receiving section,

said method comprising:

setting an axial origin for each said elevation nut section by detecting a rotational angle of a corresponding said drive section;

individually moving down said each said elevation nut section from a respective said axial origin so that light emitted from said light-projecting section is received by said light-receiving section without being interrupted; and

confirming that each said respective said axial origin is an origin of elevation by detecting interruption of light, emitted from said light-projecting section, by a corresponding said each said elevation nut section at a position corresponding to said corresponding said each said elevation nut section having been lowered from said each said respective axial origin by a prescribed light interruption dimension.

16. (New) The method according to claim 15, further comprising:

prior to setting an axial origin for each said elevation nut section,

(i) elevating said each said elevation nut section to an upper end position by rotating a corresponding said drive section; and then

(ii) when an overload of each said corresponding said drive section is detected at a corresponding said upper end position, reversing a rotational direction of said corresponding said drive section,

wherein detecting a rotational angle of a corresponding said drive section comprises detecting said rotational angle after reversing the rotational direction of said corresponding said

drive section such that a position along an axis of rotation of said each said elevation nut section is set as said axial origin.

17. (New) The method according to claim 15, wherein said light-projecting section and said light-receiving section are arranged so that light emitted from said light-projecting section cannot be received by said light-receiving section when any said each said elevation nut section has been lowered from a corresponding said origin of elevation by said prescribed light interruption dimension.

18. (New) The method according to claim 15, wherein said each said elevation nut section can consistently interrupt light emitted from said light-projecting section when said elevation nut section is located between a first position, corresponding to said elevation nut section having been lowered from a corresponding said origin of elevation by said prescribed light interruption dimension, and a second position, corresponding to a lower end position of elevation of said elevation nut section, said method further comprising:

in a state in which light emitted from said light-projecting section is interrupted, inhibiting movement of each said component holding member in a direction along a surface of the circuit board.